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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON APPLIED MATHEMATICS

High-Dimensional Inverse Problems with Generative Models

By

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Abstract

Extensive research over the last 1-2 decades has led to a variety of powerful techniques for high-dimensional inverse problems, with the prevailing approach being to introduce low-dimensional modeling assumptions such as sparsity and low-rankness. Recently, there has been a paradigm shift toward data-driven techniques, including the replacement of explicit modeling assumptions with implicit generative models based on deep neural networks. In comparison to traditional approaches, this line of work remains in its infancy, and we have explored this exciting new research avenue from both theoretical and practical perspectives. In the talk, I will discuss three parts of my work on high-dimensional inverse problems with generative models. First, I will discuss our information-theoretic lower bounds and corresponding proof techniques for linear compressed sensing with generative models. Next, I will briefly present our theoretical results about nonlinear compressed sensing with generative models. Finally, I will introduce our work studying the problem of generative model based PCA, which gives a generative counterpart to the popular sparse PCA problem.

Biography

Dr. Zhaoqiang Liu is currently a research fellow in the Department of Computer Science at the National University of Singapore (NUS). He received a B.Sc. degree in Mathematics from Tsinghua University in July 2013 and a Ph.D. degree in Mathematics from NUS in December 2017. He is broadly interested in the mathematical foundations of machine learning, deep learning, and statistical signal processing. In recent years, he has focused on the statistical analysis of high-dimensional inverse problems with deep generative models, and has published papers in journals including IEEE TSP, TIT, and JSAIT, and in conferences including ICML, NeurIPS, ICLR, and CVPR.

Date : 15 December 2022 (Thursday)

Time : 4:00pm – 5:00pm

Zoom Meeting : https://hkust.zoom.us/j/97655401309 (Passcode: 559715)

All are Welcome!